

Solo **FLIGHT**



OPERATIONS MANUAL

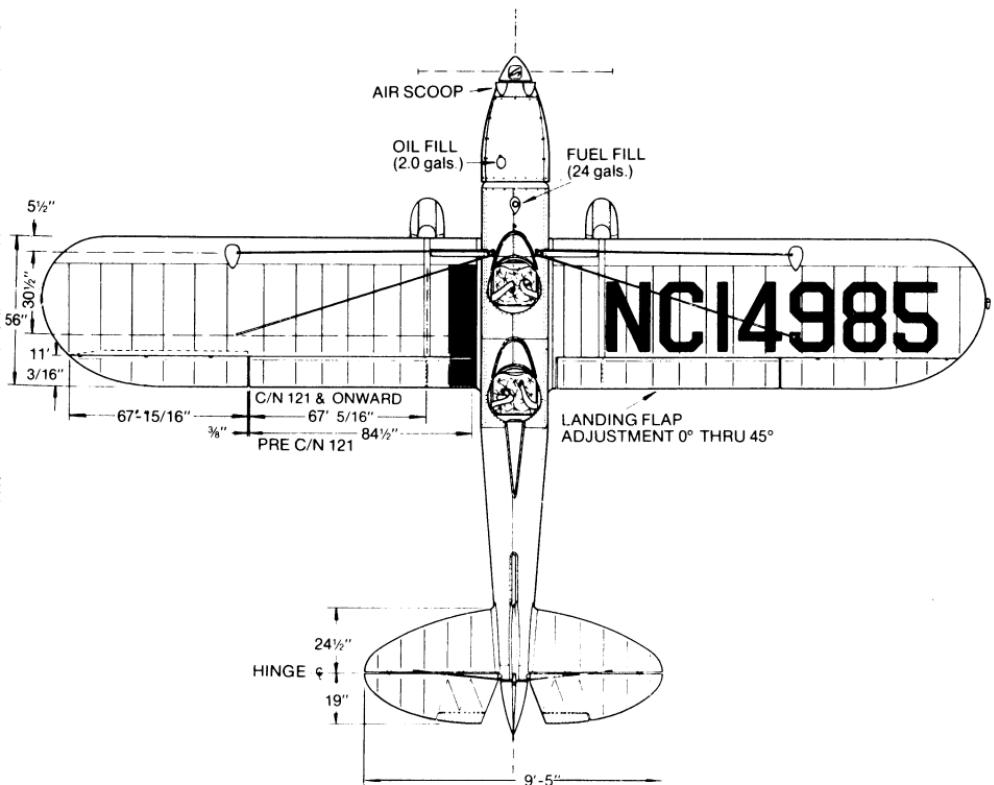
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15 JANUARY 1985
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SOLO FLIGHT

OPERATIONS MANUAL



RYAN ST-A (Top View)
circa 1934

Dear Friend,

I learned to fly at 14 when a Korean War Veteran took me up in an old L-5, spotter aircraft. It was the same type of aircraft he flew during that conflict and he really knew how to handle that bird! I was scared to death!! Anything that could be at the same time so scary, magnificent, thrilling, exciting, and wonderful had to be something I wanted to do for the rest of my life!! With SOLO FLIGHT, my partner Sid Meier and his software guys, have brought to you some of that same exhilaration I feel every time I advance the throttles for takeoff in my A-37 Dragonfly.

When we started on SOLO FLIGHT, I told Sid it had to be as realistic in the feel of flying as it was in the fancy graphics he could put on the screen. I would gladly give up pretty colors and fancy building pictures for proper glide ratios, good stick feel, emergency procedures, and fun. The first week of development, I rented a C-172, and took Sid out to teach him to fly. Since I have taught more than 200 Air Force Lieutenants to fly, one brilliant software guru was a snap! SOLO FLIGHT is the result of much good design, much hard work, many rejections of the product by me because it didn't feel like flying, and a great desire to bring you the easiest to learn, MOST FUN, most like flying, most tested by real pilots, Primary Flight Training Simulator on the market today!!!



Special thanks to all the play testers including the 103rd TASS of the PA Air National Guard and for the software guys who made it all possible. We are very proud of their achievements in SOLO FLIGHT. I'd say more but I know you are anxious to get airborne and so am I.

Bill Jr. is one of SOLO FLIGHT's greatest fans. At 12 and with considerably fewer flying hours than Dad's 3000 hours he is also one of the best SOLO FLIGHT pilots around. Today, we are going to practice our SFO's (Simulated Flame Out Landings). We take turns climbing each other to various heights above the airfield, cutting the engines, and seeing if we can make the field. Then after that little warmup, we'll be ready for the real challenge — the MAIL PILOT GAME — we are going tough — the COMMAND level in COLORADO! We will have great fun with SOLO FLIGHT today and I know you will too!! GOOD FLYING TO YOU!!



FIGHTER PILOT
PRESIDENT
MICROPROSE SOFTWARE

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I PROGRAM MANUAL

1. INTRODUCTION

SOLO FLIGHT is an exciting real time flight simulator which enables you to experience the fun, challenge, and learning that comes with flying your own light aircraft. SOLO FLIGHT is a primary flight trainer similar in flight training objectives to the T-37 "Tweet" flown by the USAF since 1962. In SOLO FLIGHT and the "Tweet" both inexperienced and experienced pilots can learn everything from basic flying proficiency maneuvers like slow flight, through normal day VFR landings, up to the thrill and danger of cross-country weather flying!! SOLO FLIGHT is easy to get started with, but you will get hooked on its fun and excitement! And, when you think you have all the basics well under control, then try the MAIL PILOT GAME. This portion of the program sends you on a real historical flying mission — delivering the AIR MAIL solo in the 1930's. You will have to face all the dangers of real cross-country flying including deteriorating ceilings, increasing cross winds, mechanical failures, and maybe even an overheated engine. MAIL PILOT will test your real skills and provide you "ALL THE FLYING CHALLENGE YOU CAN HANDLE!"

The SOLO FLIGHT aircraft characteristics used in this simulation are closely related to the famous RYAN series of monoplanes like "SPIRIT OF ST. LOUIS" flown by Charles Lindbergh across the Atlantic in 1927. You are luckier than those brave pilots of the thirties however, because we have given you a few more instruments to help your navigation. We have also reduced slightly some of the more dangerous characteristics of those famous airplanes.

Most of all we have made flying fun and easy for you to learn and enjoy. Then when you are ready, we have provided you with the opportunity to experience the old adage first hand that "Flying is hours and hours of Shear Boredom punctuated by moments of Stark Terror!" As we real pilots know, there is a great sense of accomplishment and joy in between. HAVE FUN!

2. LOADING THE SIMULATION

REMEMBER, SOLO FLIGHT, is JOYSTICK controlled and you MUST have a JOYSTICK to enjoy the simulation!!

A. COMMODORE 64/128

Turn on your disk drive and computer as described by the manufacturer. (For the C-128, establish the C-64 mode as described by the manufacturer.) Then place your diskette into your drive. Type: **LOAD "*", 8, 1**. The program will boot automatically. Leave the disk in the drive.

IMPORTANT: Put the JOYSTICK in PORT #2 (TWO) — The Port toward the rear of the machine. Otherwise you will not be able to control the aircraft.

B. APPLE II Family

Place the diskette in your disk drive and turn on the computer. The disk will boot automatically. Leave the disk in the drive. (Make sure the caps-lock is on if your Apple has lower case.)

C. IBM PC

Place the diskette in your disk drive and turn on the computer. The disk will boot automatically. Leave the disk in the drive.

D. ATARI 400/600/800/1200/XL/XE Series

REQUIRES: 48 K RAM

REMOVE all cartridges.

Place the disk in your disk drive and turn on the computer. The program will boot automatically. Leave the disk in the drive. (For XL Series — Hold down the **OPTION** key as you turn the computer on.)

IMPORTANT: After the simulation has loaded, you will be shown the first option screen with a demo timer counting down at the bottom of the screen. You must start the simulation by pressing the **START** key (see computer chart) **before** the demo timer reaches 0. If the demo timer reaches 0, the simulation will begin in demo mode and you **will not be able to control the aircraft!**

3. COMPUTER CHART

SOLO FLIGHT is available for Commodore 64, Apple, IBM PC, and Atari computers. To accommodate the differences in keyboards, the following conventions are used in the documentation.

Documentation	C64	Apple	Atari	IBM
"OPTION"	"F1"	"1"	OPTION	"O"
"SELECT"	"F3"	"2"	SELECT	"S"
"START"	"F7"	"3"	START	ESCAPE
Looking Out The Cockpit:				
Left View	SHIFT  CRSR 	 or A	+	
Right View	 CRSR 	 or S	*	
Forward View	SHIFT  CRSR 	 or W	-	
Backward View	 CRSR 	 or Z	=	

4. OPTIONS

Use the **OPTION** key to select practice FLYING or the MAIL PILOT game. The **OPTION** key also selects which of three states you wish to fly in. (Kansas, Washington, or Colorado). Use the **SELECT** key to choose the difficulty level. During Flying practice you may select CLEAR weather (for touch and go practice in the local area), LANDING practice (places the aircraft on short final for landing), WINDY (contest - C-64 only) conditions, or IFR (Instrument Flight Rules — low clouds). When playing the Mail Run game you may select from the STUDENT Pilot, PRIVATE Pilot, SENIOR Pilot, or COMMAND Pilot difficulty levels. Press **START** to continue.

5. MAIL PILOT AUTHORIZATION CODES

(Does not apply to ATARI versions.)

IMPORTANT READ CAREFULLY

In the mail pilot game, you will be asked to enter your mail carrier security code. To determine the correct code, read the security code # displayed by the computer when it asks for the authorization code. Then go to the countercode tables (found in the SEPARATE CODE TABLES LOCATED ON EACH PAGE OF THE INSTRUCTIONS).

Locate the code # given by the computer. Located directly beneath the computer generated code # is the countercode response. Type the counter-code into the computer and press the **RETURN** key. If an incorrect counter-code is entered and the **RETURN** key has not yet been pressed, the player may reenter the correct countercode and then press the **RETURN** key. The last value entered before the **RETURN** key is pressed is taken to be the countercode.

FOR EXAMPLE: If your Commodore 64 computer displays "ENTER MAIL CARRIER SECURITY CODE (1)", you would consult the code boxes located throughout this manual. The box containing the number "1" is found below. Match the number and the computer type to determine the correct code response. In this case "**H**" is the correct response. Type the letter "**H**" and press **RETURN**. For your APPLE, you would press "**G**" and **RETURN**.

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.				
	SECURITY CODE / ACCT. NO.	1	2	3
RESPONSE	C-64	H	E	L
	APPLE	G	F	C
	IBM	T	I	F

IMPORTANT: If you do not enter the CORRECT CODE you will be unable to control the simulation either because of bad weather or lack of fuel.



Charles A. Lindbergh's "Spirit of St. Louis"

II FLIGHT MANUAL

A. FLIGHT TRAINING

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.				
SECURITY CODE / ACCT. NO.	4	5	6	
RESPONSE	C-64	A G IBM	M L P	D F P

1. BASIC FLYING

Two controls are used for most basic flying — the control stick or yoke and the throttle. The joystick (yoke) changes the attitude of your aircraft; the throttle affects your speed. Use the joystick to make your plane turn, climb, and dive. Holding the stick to the right causes the plane to bank (tilt) to the right; when the plane is banked right it will turn to the right. Note that when you center the joystick, the plane will remain banked and will continue turning. Bring the plane back to a level attitude by pushing the stick opposite the direction of bank. Pushing forward (toward your screen) on the stick will cause the nose to go down and your plane will dive. Pulling back on the stick will bring your nose up. The throttle controls the amount of power generated by your engine. Maximum power is required when taking off and climbing, somewhat less power is needed for cruising, and low power is generally sufficient for landing.

Remember that there is a relationship between the pitch attitude (nose up) and the amount of power required to hold level flight. At low airspeeds, significantly more nose up (more pitch or angle of attack) is required for level flight. Many small airplane pilots use pitch to control airspeed and power to control altitude. Jet pilots, on the other hand, are taught to use pitch to establish the right glide path to touchdown. They use the throttle to control airspeed. Both approaches to altitude and airspeed control are correct and both are taking advantage of the interrelationships between pitch attitude, angle of attack, power setting, and airspeed. No change can be made to one of these factors without influencing the others. Generally, when the nose comes up, airspeed goes down, and vice-versa. Power changes can be used to modify the effect of pitch changes. Alternatively, when power is reduced, the nose starts down unless stick back pressure is applied. Power up, and the nose will start back up. To achieve perfect aircraft control on final approach, all of these factors must be taken into account so that constant airspeed and descent rate can be established and maintained to touchdown. Your SOLO FLIGHT aircraft has all of these characteristics built in. It will be your job to master them so you can fly and land under all flying conditions.

2. "INSTRUCTOR PILOT" OPTION (C-64, IBM only)

The Instructor Pilot is active during flying practice in the CLEAR weather and LANDING practice modes. The instructor pilot offers flying assistance in the form of messages displayed at the top of the dashboard. The instructor pilot guides you through a takeoff sequence, a climb of 1500 feet, a box pattern to the left, final approach, and a landing. If you complete the landing, you are certified for solo flying and the instructor pilot signs off. You may disable the instructor pilot at any time by pressing "I".

3. CONTEST MODE (C-64 only instead of windy landing option)

The CONTEST mode allows multiple players to compete in completing a tricky cross-wind landing. Each landing is scored based on how slowly and gently the plane is landed.

4. VIEW

The top half of the flight screen shows your plane and the local terrain highlights. If you are at a low altitude your shadow will be visible on the ground. Airports are black, VOR towers, farms and mountains are white. If you fly into or above the clouds, ground objects will not be visible. Generally the view is to the front; you may look to the side or behind you using the appropriate commands. (see COMMANDS)

5. INSTRUMENTS (see center graphic)

The bottom half of your screen contains your flight instrumentation. The large dial on the right is your altimeter. Each mark on the dial is 1000 feet for the small hand and corresponds to a complete revolution of the large hand. The large dial on the left is your speed indicator which goes from 0 to 180 knots. The circle in the middle is your artificial horizon/attitude indicator which indicates your attitude relative to the horizon. The vertical strip on the right is your throttle indicator. Maximum power is at the top, zero power is at the bottom. The four digital indicators at the lower left are very important. The first value is your pitch, positive values indicate your nose is up, negative values mean nose down. Precise control of your pitch is sometimes necessary to achieve the proper climb or dive rate. The next number is the degrees of flaps that are extended. The next value is a digital and alpha directional compass reading. Zero degrees is due North, 90 is East, 180 South and 270 is West. The bottom indication is your Vertical Velocity Indicator (Climb). Positive values indicate you are gaining altitude, negative values indicate you are losing altitude.

C-64 only – improvements have been made to your RYAN monoplane cockpit instrumentation. Your airspeed indicator and altimeter locations have been exchanged and a larger attitude indicator has been installed. A new instrument, the VVI, has also been installed. Vertical velocity is indicated on the far right dial: if the dial indicator is in the “nine-o-clock” position you are flying level; if the indicator is pointing up, you are climbing; if the indicator is pointing down, you are descending.

Your fuel gauge is on the lower right. The indicator light center left is your temperature warning light. It will flash if your engine is overheating. The two status lamps center right indicate that your landing gear are down and your brakes are applied when illuminated. Your navigational instruments are at the lower right. The two VOR readouts indicate the directional bearing and distance from the VOR stations. The ILS system shows whether your landing approach is high, low, left, right, or on the proper path relative to your distance from the runway (see “Instrument Flying” for a further description of these systems). Your elapsed time is displayed at the upper right.

C-64 only – a new DMI, Distance Measuring Indicator, has been installed to complement your dual VOR system. This indicator is located just to the right of your digital radial indication in the bottom right hand corner of your instrument panel. This digital readout indicates your current nautical miles distance from the VOR station.

6. FLIGHT CONTROLS

In addition to control via the joystick, a number of commands may be entered through the keyboard.

THROTTLE: The numbers "0" to "9" control your throttle. Zero is no power, 9 is maximum power.

NOISE: Press "N" to turn on/off the engine noise. (IBM only.)

LANDING GEAR: Press "L" to raise or lower the landing gear.

BRAKES: Press "B" to apply or release the brakes.

FLAPS: Press "F" to control the flaps. You may use 0, 20, or 40 degrees of flaps.

VIEWS: (See Computer Convention Chart on page 5.)

NOTE: For Apples without cursor keys, the following may be used:

W-Front, A-Left, S-Right, Z-Back.

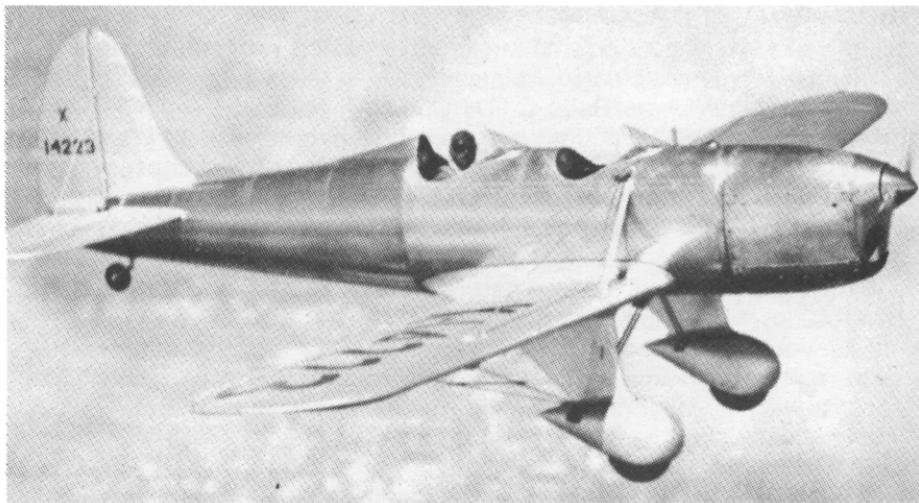
PAUSE: Press "P" to pause the game. Press any other key to continue.

RESTART: Press "START" to restart (see computer chart).

EMERGENCY: If you wish to create an emergency equipment failure for practice purposes, press the "E" key.

SLIP: Bank your aircraft and press the joystick trigger to put your plane into a sideslip. This maneuver, usually performed by crossing the rudder and ailerons, allows you to slip your plane into the wind to lose altitude without changing the heading of the aircraft.

JOYSTICK ADJUST: (Apple only) Center your joystick and press "J" to adjust the game to your joystick.



S-T "Sport Trainer", 1934-37

7. MAIL PILOT GAME

The mail pilot game tests your flying skills and judgment. Your task is to deliver five bags of mail to their destinations in the least amount of time. Once you have selected the Mail Pilot game, a map will be displayed. (Map will not be displayed on cassette versions.)

A. DEPARTURE

Press **START** to continue. You may be asked to enter your Mail Security Code. If so, follow the instructions in Section 1.5 of this manual. (If you were not asked for your code, you will be asked after your first landing. Follow the same instructions.)

Now you must make decisions on how many destinations and mail bags you will accept on your first mission. Follow the instructions on the screen to get destination assignments. The destination(s) will be displayed on the screen under "MAIL FOR:". You may load up as much mail as you like, however, each bag adds to the weight of your plane and increases the difficulty of flying. One or two bags is recommended.

Now choose the amount of fuel you want to carry. Remember fuel adds weight. The more weight the more sluggishly the aircraft responds. On a hot day, at high altitudes, in Colorado you may not be able to get off the ground!! It's your choice!

Press **START** and you will be shown the map again. Take some time here to note which landmarks you will be passing, VOR bearings, nearby airports, etc. This information can be extremely valuable if conditions change while enroute. When you are ready to take off, press **START** again to begin your flight.

B. ENROUTE

As the game progresses, the weather will gradually deteriorate. Winds will get stronger, clouds may come in, and turbulence may develop. At the higher difficulty levels your plane is also prone to mechanical and instrument failure. Your engine may overheat and various instruments may become inoperative. All malfunctions are repaired when you land at an airport.

C. ARRIVAL AND SCORING

When you arrive at your destination airport and stop your aircraft, your Landing Points are calculated. Points are gained for slow landings (Speed) with gentle touchdowns (Rate). Delivery points are also accumulated based on difficulty level (500 to 2000), state map chosen (Kansas - 500; Washington - 1000; and Colorado - 1500), and time used (0-2000). If you crash, you will be told why. CRASH LANDING indicates you hit the ground too hard or forgot to extend the landing gear; MISSED RUNWAY means you neglected to land on the runway or taxied off the runway; GROUND LOOP indicates you tried to turn your plane too sharply while taxiing; STALLED means you flew too slowly and stalled your plane.

After you have landed, the map will be displayed and your enroute course will be plotted on the map. This feature allows you to study your navigational success and plan for your next leg. You may now load additional mail or fuel, and continue the game. The game ends when five bags of mail have been delivered or when you crash.

Scoring is based on landing points, difficulty level, state map chosen, elapsed time, and mail delivered. Good luck!

(Although this is a real time simulation, we have shortened some of the navigation time that would normally be required to fly between the identified airports.)

8. EMERGENCIES

At the more advanced difficulty levels your aircraft is prone to instrument and mechanical failure. If the temperature light begins to blink, your engine is overheating and will cut out shortly. Find a place to land. Your altimeter, airspeed indicator, digital heading indicator, and VOR indicators may also malfunction and register zero readings. The artificial horizon could also cease functioning. Landing at any airport will repair your aircraft.

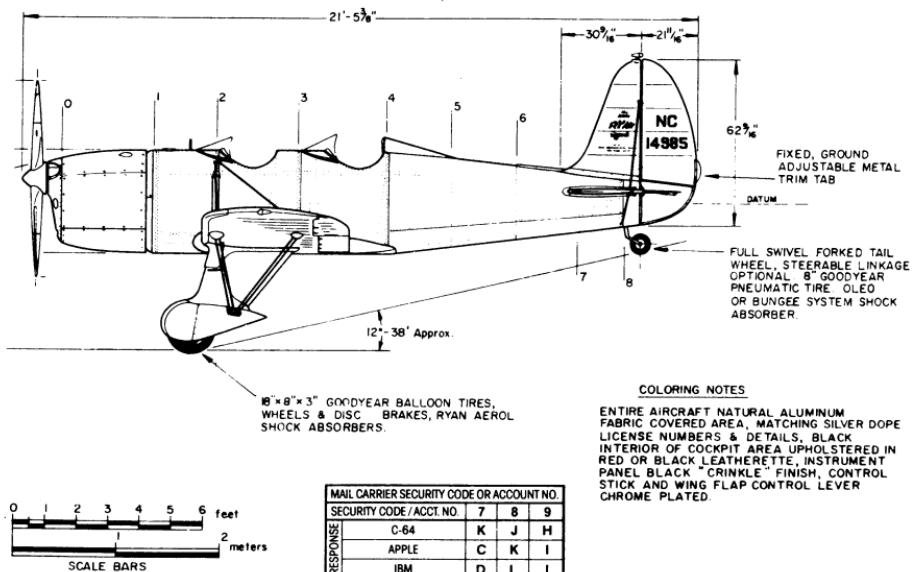
Remember, there are three basic rules of flying during an aircraft emergency.

1. Maintain aircraft control.
2. Analyze the situation and take proper action.
3. Land as soon as conditions permit.

Most aircraft emergencies do not require instant reaction (exclusive an engine failure on takeoff leg). They do require careful planning. Performance instrument failure can be overcome through the use of the remaining instruments. Engine failure can be managed by maintaining sufficient inflight altitude to make a dead stick landing to an emergency airfield along your route of flight. (Your SOLO FLIGHT aircraft has approximately a 9 to 1 glide ratio.)

The most difficult emergencies are multiple emergencies where problems compound themselves. Losing your attitude indicator in instrument conditions can be one of the most frightening occurrences in real flying. Combine this emergency with engine failure and smoke in the cockpit, and the pilot would be happy to use his silk elevator (parachute) to get his body back on the ground in one piece!

Emergency procedures may be practiced through the use of the "E" key. Multiple actuations of the "E" key will cycle the program through all the emergencies possible in the simulation.



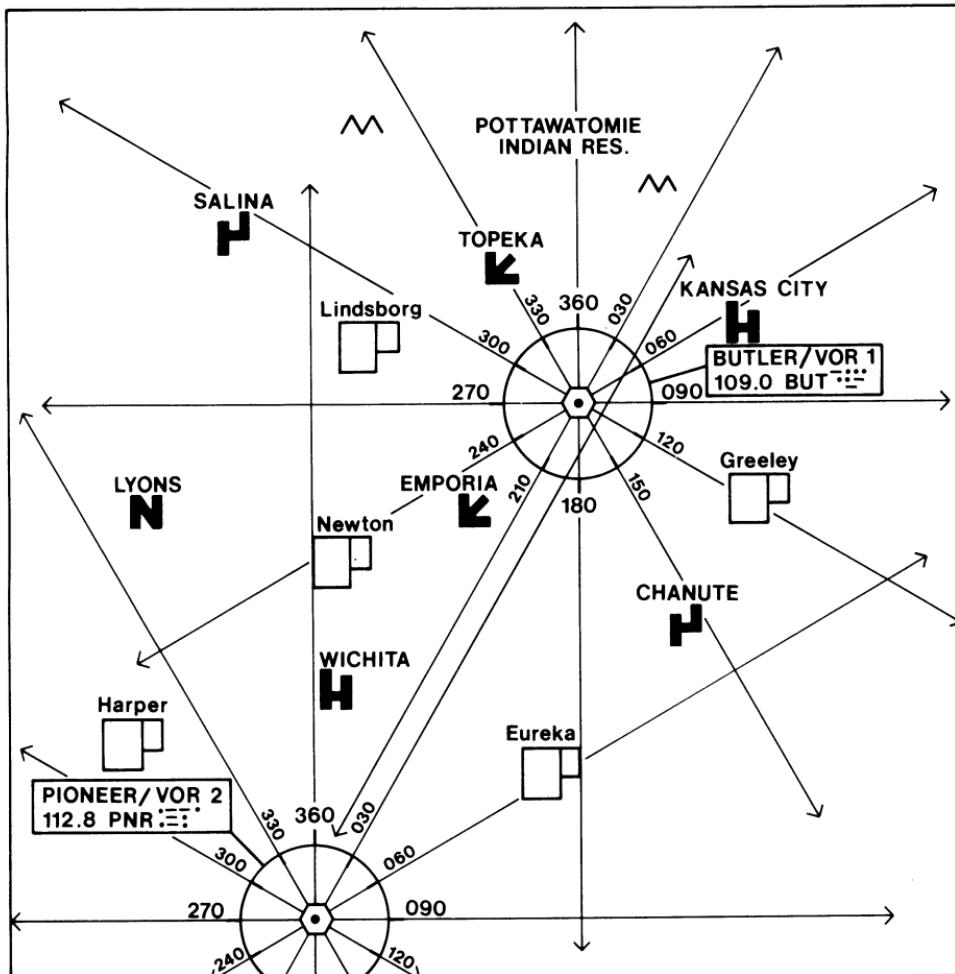
9. WEATHER

The current weather conditions are displayed at the bottom of the screen: wind direction and speed, cloud ceiling in feet, and visibility in miles. Under windy conditions, landing your aircraft becomes tricky, especially if the wind is blowing across the runway. Use less flaps, higher airspeeds, and aircraft slips to compensate for winds. Low clouds often require instrument flying, although you may choose to fly above the clouds.

10. STATE MAPS

KANSAS: Kansas is a nice flat state, ideal for novice flyers. Wichita and Kansas City have airports with long, wide runways. There are also many nice cornfields and mysterious Indian pyramids to fly over. VOR 1/VOR 2 bearings for Kansas are: Wichita - 222/001, Lyons - 252/336, Emporia - 225/022 Chanute - 154/052, Salina - 295/353, Topeka - 330/016, Kansas City - 065/036.

KANSAS

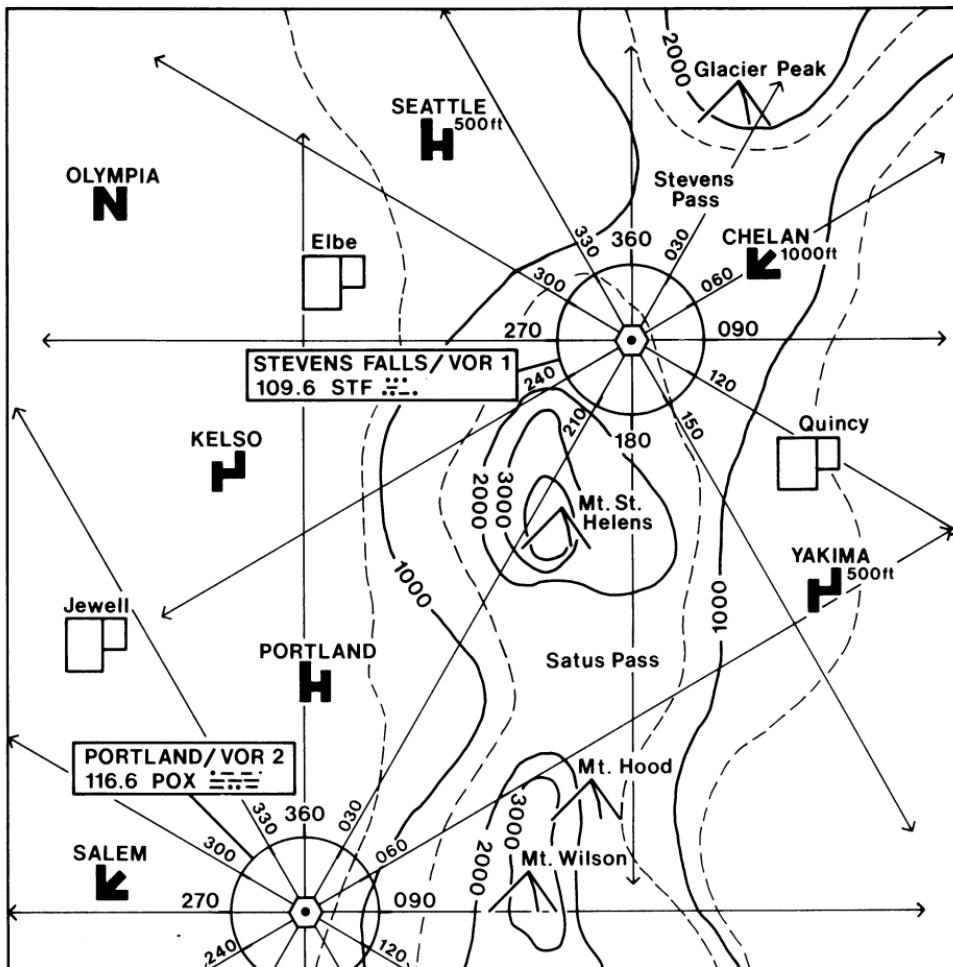


MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	10	11	12
C-64	F	N	O
APPLE	G	T	E
IBM	P	M	N

SIMULATED MAP SCALE (NM)			
5	0	5	10
IF FOR FINAL APPROACH DISTANCE CALCULATIONS ONLY			

WASHINGTON/OREGON: Washington has a mountain range separating the coastal cities from Chelan and Yakima. Some of the mountains are up to 4000 feet high although the two mountain passes can be traversed at 2000-2500 feet. Three of the Washington airports are also elevated. Navigational information for Washington: Portland - 223/001, Salem - 224/278, Kelso - 251/350, Olympia - 284/344, Seattle (500 feet elevation) - 314/010, Chelan (1000 feet) - 060/035, Yakima (500 feet) - 142/059.

WASHINGTON



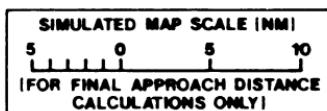
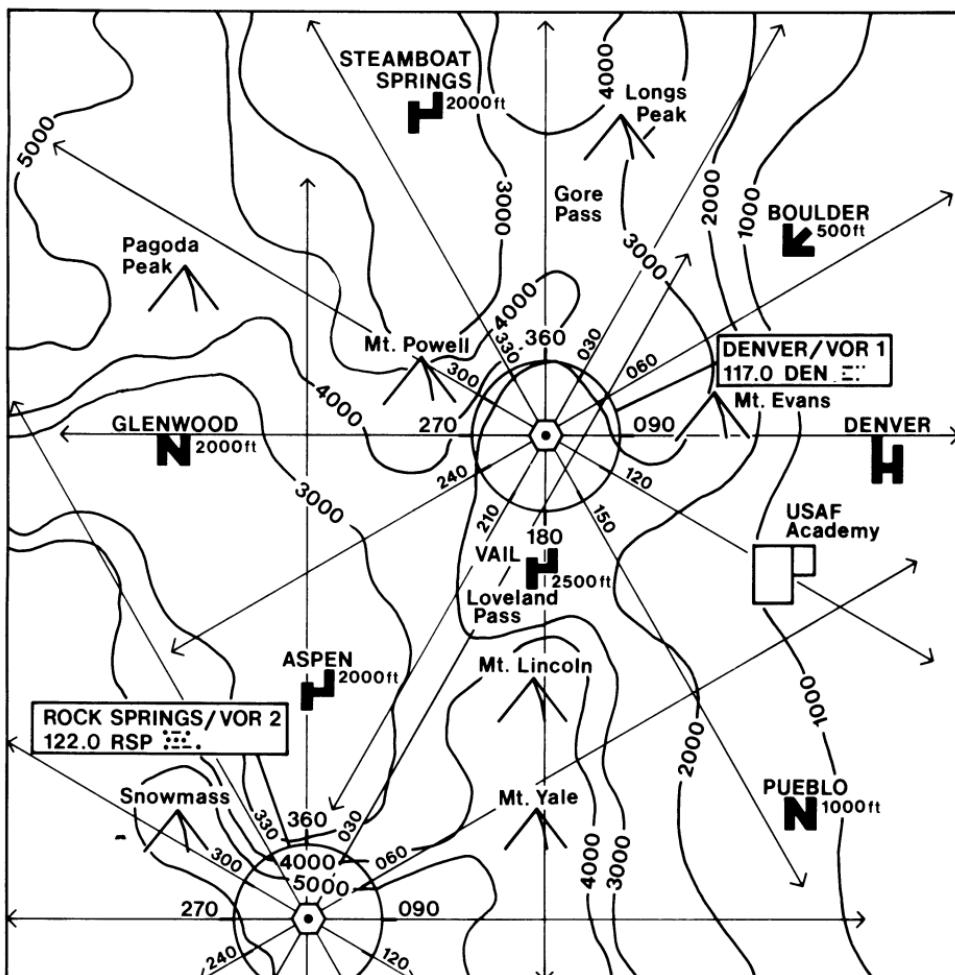
MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	13	14	15
RESPONSE	C-64	D O P	
	APPLE	M Y R	
	IBM	F T B	

SIMULATED MAP SCALE (NM)			
5	0	5	10
FOR FINAL APPROACH DISTANCE CALCULATIONS ONLY			

COLORADO: Flying between the small airstrips nestled in the Rocky Mountain Valleys of Colorado is the ultimate challenge for a mail pilot: Aspen (2000 feet elevation) - 223/001, Pueblo (1000 feet) - 143/074, Glenwood (2000 feet) - 264/343, Vail (2500 feet) - 184/030, Denver - 098/050, Boulder (500 feet) - 053/037, Steamboat (2000 feet) - 334/008.

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	16	17	18
C-64	E	Q	P
APPLE	N	R	R
IBM	O	E	K

COLORADO



STANDARD EQUIPMENT

All models of the 1937 Series are exceptionally well equipped and include many features as standard which would otherwise cost \$600 to \$700 as "extras."

Wing flaps with new, instant lever control.

Tab balance controls.

Wheel pants, wing fillets and fairing throughout.

N.A.C.A. in-line engine cowling.

Full swiveling, pneumatic tail wheel.

Tail wheel swivel lock, controllable from cockpit.

Full airwheels.

Wheel brakes, controlled from both cockpits.

Long stroke, oleo type shock absorbers.

Wiring for position lights.

Baggage compartment.

Sesame combination lock.

Direct reading fuel gauge.

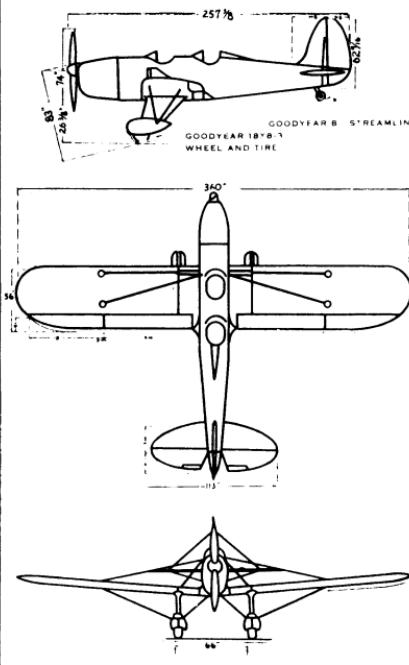
Reserve fuel supply system.

Complete set dual controls.

Impulse hand starter.

Altimeter.

Tachometer.



Compass.

Airspeed indicator.

Oil pressure gauge.

Oil temperature gauge.

First aid kit.

Fire extinguisher.

Tool kit.

Aircraft and Engine Log Book.

Aircraft and Engine Instruction

Manuals.

Parachute type seats.

Attractive cockpit upholstering, including thick cushions and back pads.

FOREIGN SHIPMENT

All models of the new Ryan S-T series when boxed for foreign shipment are carefully treated with a special cosmoline coating and wrapped as an extra preventative against salt water exposure. Wings and tail surfaces are disassembled and the plane and motor placed in one box of the following dimensions:

English Metric

Length	20' 4"	6.20 M
Width	5' 3"	1.91 M
Height	4' 8"	1.42 M
Total Weight....	2400 lbs.	1088 kg.
Total Content....	593 cu. ft.	16.8 M ³

SPECIFICATIONS AND PERFORMANCE

Models S-T, S-T-A, and S-T-A Special

Model.....	S-T.....	S-T-A.....	S-T-A Special.....
Engine—Menasco.....	B-4	C-4	C-4-S (Supercharged)
Horsepower.....	.95 H.P. at 1975 R.P.M.	125 H.P. at 2175 R.P.M.	150 H.P. at 2275 R.P.M.
Wing Span.....	30'	30'	30'
Length Overall.....	21' 5 3/8"	21' 5 3/8"	21' 5 3/8"
Height Overall.....	6' 11"	6' 11"	6' 11"
Wing Area.....	124 sq. ft.	124 sq. ft.	124 sq. ft.
Fuel Capacity.....	24 gal.	24 gal.	24 gal.
Fuel Consumption per hr.....	7 gal.	8 gal.	8.6 gal.
Propeller Clearance—Level.....	23.75"	23.75"	22.25"
Airfoil Section.....	N.A.C.A. 2412	N.A.C.A. 2412	N.A.C.A. 2412
Wheel Tread.....	66"	66"	66"
Tire Size (Air wheels).....	18 x 8-3	18 x 8-3	18 x 8-3
Tail Wheel Size.....	.8" Pneumatic	.8" Pneumatic	.8" Pneumatic
Weight Empty.....	1023 lbs.	1023 lbs.	1058 lbs.
Useful Load.....	552 lbs.	552 lbs.	517 lbs.
Gross Load (Maximum).....	1575 lbs.	1575 lbs.	1575 lbs.
Range (Cruising).....	400 mi.	350 mi.	350 mi.
Maximum Speed at Sea Level.....	140 M.P.H.	150 M.P.H.	160 M.P.H.
Cruising Speed at 2000 ft.....	120 M.P.H.	127 M.P.H.	135 M.P.H.
Rate of Climb (Sea Level).....	850 ft./min	1200 ft./min	1400 ft./min.
Service Ceiling.....	15,500 ft.	17,500 ft.	21,000 ft.
Landing Speed.....	42 M.P.H.	42 M.P.H.	42 M.P.H.
Landing Speed with Flaps Up.....	50 M.P.H.	50 M.P.H.	50 M.P.H.
Take-off Run with Full Load.....	190 yds.	175 yds.	145 yds.

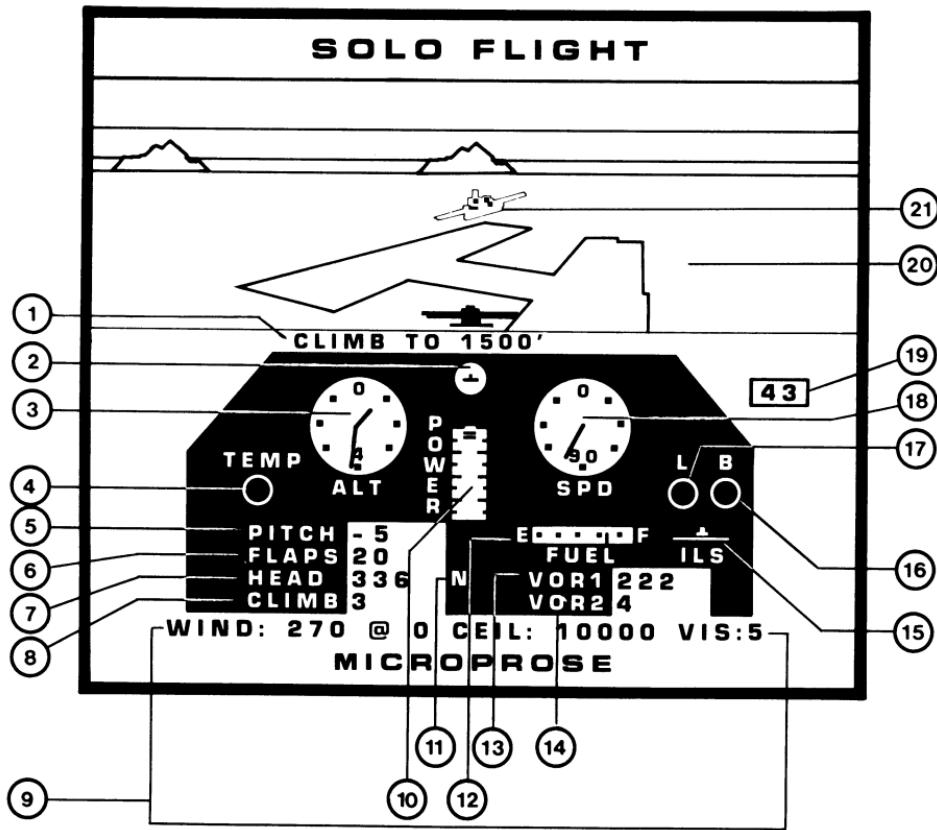
RYAN AERONAUTICAL COMPANY

LINDBERGH FIELD, SAN DIEGO, CALIFORNIA

CABLE ADDRESS "RYANCO"

1937 RYAN BROCHURE

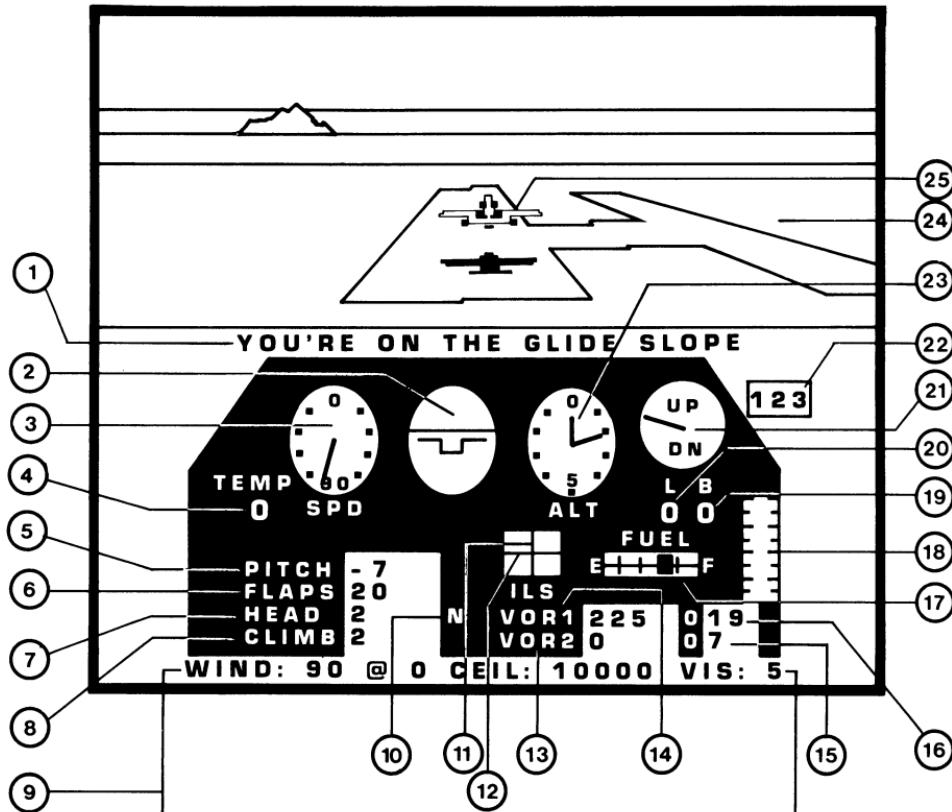
SOLO FLIGHT



APPLE, ATARI, and IBM

1. Instructor Pilot Instructions (IBM only)	8. Vertical Ascent/Descent (100 FPM)	15. ILS Glide Slope Indicator
2. Altitude Indicator	9. Weather Line	16. Brake On/Off Light
3. Altimeter (Feet)	10. Throttle Indicator	17. Landing Gear Down Indicator
4. Engine Overheat Indicator	11. Compass Heading	18. Airspeed Indicator (Knots)
5. Pitch (Degrees)	12. Fuel Quantity (Gallons)	19. Time Elapsed Indicator
6. Flap Indicator (Degrees)	13. Radial from VOR 1	20. Outside 3-D View
7. Heading Indicator (Degrees)	14. Radial from VOR 2	21. Your Aircraft (VFR only)

COCKPIT LAYOUT



COMMODORE-64

1. Instructor Pilot Instructions	9. Weather Line	18. Throttle Indicator
2. Attitude Indicator	10. Compass Heading	19. Brake On/Off Light
3. Airspeed Indicator (Knots)	11. ILS Localizer	20. Landing Gear Down Indicator
4. Engine Overheat Indicator	12. ILS Glide Slope Indicator	21. Vertical Velocity Indicator (FPM)
5. Pitch (Degrees)	13. Radial from VOR 2	22. Time Elapsed Indicator
6. Flap Indicator (Degrees)	14. Radial from VOR 1	23. Altimeter (Feet)
7. Heading Indicator (Degrees)	15. DME from VOR 2	24. Outside 3-D View
8. Vertical Ascent/Descent (100 FPM)	16. DME from VOR 1	25. Your Aircraft (VFR only)
	17. Fuel Quantity (Gallons)	

11. FLYING TIPS

A. TAKE OFF

Taxi to the end of the runway (throttle 2-3). Stop and turn to face down the runway. Set takeoff flaps, (normally 20%). Apply maximum power (9). When your speed reaches 85 knots (80 with 20 degrees of flaps) pull back on the stick until your pitch is plus 8-9 degrees. When you are safely airborne, with a positive VVI, retract your landing gear. Above five hundred feet, retract your flaps. (Notice that your lift is decreased as flaps are raised. Additional pitch is required to maintain the same climb rate.) When you reach your desired cruising altitude, reduce power and level off.

B. LANDING

Landing your airplane is probably the most difficult skill to master. As you approach the destination airport, line the aircraft up with the desired runway as early as possible. Approach the airport at 1000 to 1500 feet above field elevation. When the ILS becomes active, climb or descend to center yourself on the ILS display. Lower your landing gear, reduce your throttle to 4, and adjust your pitch to maintain a descent rate of -4(00) or -5(00) feet per minute. As you approach the runway, reduce your descent rate by slowly raising the nose of the aircraft. Airspeed control is extremely critical. Too much airspeed and the aircraft will float off the other end of the runway or not stop in the available runway. Too little airspeed, and the aircraft will stall during the flare and touchdown. With 20% flaps, the aircraft should be flown down final at approximately 70 knots. With no flaps, increase final airspeed by 10 knots. Full flaps allow a 10 knot reduction in final airspeed and are handy for short field takeoffs and landings.

If you end up high on final, reduce power, lower full flaps, and lower your nose to maintain 65-70 knots. A slip into the wind may also allow the aircraft to get rid of excess altitude. To slip, align the aircraft with the landing runway, bank into the prevailing wind, and hold top rudder. (Top rudder is available by holding down the fire button on the joystick.)

If you are coming in too low, apply a little more throttle and increase your pitch. This is known as a dragged in approach and is not safe. If your aircraft lost power during a dragged in final, the aircraft would sink into the earth shortly after power loss, with no chance to glide to the runway.

Just before you touch down, pull back slightly on the stick to reduce your descent rate. Smoothly reduce power and attempt to reach zero descent rate just as the wheels touch the runway. Be careful however, if you flew a low dragged in approach. The high pitch attitude and power settings required for such an approach means that power reduction may result in an over rapid airspeed loss and stall before the aircraft touches down. With the proper glide slope, raising the nose and reducing the power in the flare will result in a 10 knot reduction of airspeed from final approach airspeed to touchdown speed and a zero sink rate at touchdown! In pilot talk, that landing has been "greased". Once the aircraft is on the runway, cut your power (hit the zero digit on the keyboard) and apply the brakes, (hit "B"). Attempt to stop the aircraft before the end of the runway. (On some of the shorter runways this will be difficult unless you fly a short field approach [full flaps, 10 knots low on airspeed] and land very close to the approach end of the runway.)

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	19	20	21
C-64	R	F	N
APPLE	Q	T	U
IBM	P	I	O

Being able to land your aircraft under any conditions at any airport in the world is part of the thrill of being a great pilot. Practice your landings well and don't be afraid to "take it around" if the landing does not look right. Remember, the only good landings are those you can walk away from!! (Use the Practice/Landing Option if you are having trouble with landings.)

CAUTIONS: Take heed of the following cautions, especially at the advanced difficulty levels.

1. Don't make sharp or high speed turns while taxiing. Your landing gear struts are delicate and you are liable to ground loop.
2. Don't lose your airspeed and stall when attempting a slow landing. Use your flaps to lower stall airspeed.
3. Plan your route on the map before taking off. A sudden lowering of the clouds or an emergency may hide familiar landmarks or require an immediate landing.
4. Don't run your engine at full power for too long: overheating is likely to occur.
5. Don't overload the aircraft. With a heavy mail and fuel load, your aircraft will be very sluggish. The aircraft will have a hard time taking off from elevated Colorado airports, and will require longer landing distances.

B. INSTRUMENT TRAINING

1. INSTRUMENT FLYING

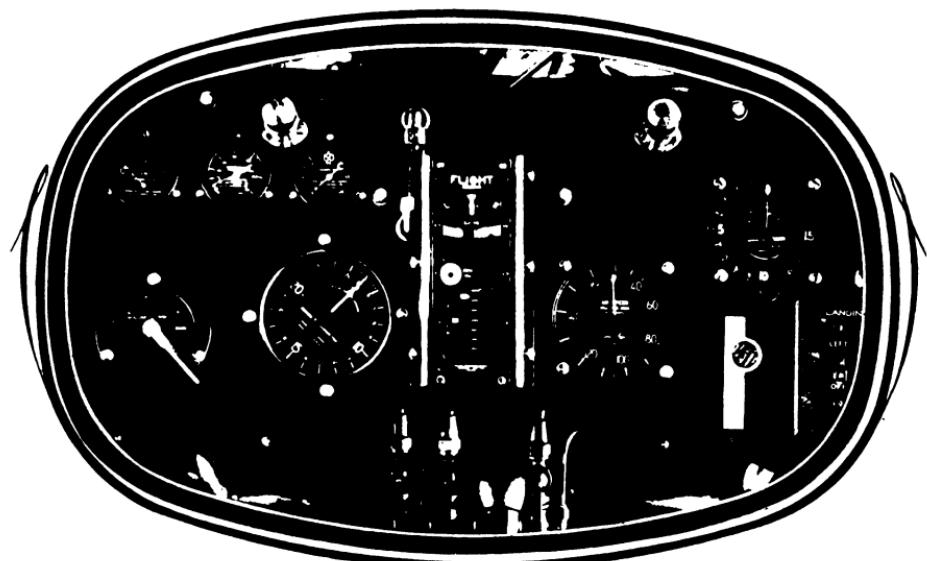
Instrument flying is the most difficult flying that pilots accomplish. Instrument pilots must be able to accomplish all of the normal duties of VFR flying — from takeoffs, to cross-country flying, to landings — and handle the complexities of bad weather. VFR flying is accomplished primarily by looking out the cockpit windscreens and utilizing both the horizon and prominent landmarks to keep the sky up and the pilot oriented geographically. Take away the horizon and the prominent landmarks, and the challenge increases by 400%.

Good Instrument Flying requires a superior instrument cross-check, situation awareness, navigation planning, and the ability to quickly absorb, analyze, and react to the information received in the instrument cross-check. Additionally, instrument procedures including VOR navigation, ILS techniques, high and low altitude instrument approaches, must be understood and practiced for the pilot to survive the challenge of instrument flying.

2. INSTRUMENT CROSSCHECK

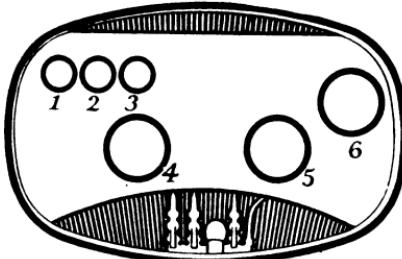
The instrument crosscheck is the way the pilot scans the information available on his instruments so he can make the continual small changes to aircraft attitude, power setting, and navigational direction required for safe instrument flight. The crosscheck is used for one scan, small changes are made, and the scan is begun again. No one instrument can consume an inordinate amount of time in the crosscheck, and the pilot should be continuously scanning. An excellent instrument pilot will scan his indicators 20-30 times a minute.

The instrument crosscheck on your SOLO FLIGHT aircraft should focus on the attitude indicator in the center of your panel. This instrument tells the pilot when he is banked (and which direction) and indicates the pitch of the aircraft. Keeping the wings level enables that pilot to fly a navigational



Six Consolidated Instruments On Lindbergh's New Ryan Brougham

- 1. Air pressure gauge
- 2. Temperature gauge
- 3. Oil pressure gauge



- 4. Tachometer
- 5. Air speed indicator
- 6. Altimeter

THE reproduction above is from an actual photograph of the instrument board of Colonel Charles Lindbergh's new Ryan Brougham. With the accompanying explanatory diagram it shows the exact position of each of the six Consolidated Instruments with which Lindbergh's new ship — like all Ryan airplanes — is equipped.

Consolidated dash lights and navigation lights are also employed on this flashing successor to the world-famed "Spirit of St. Louis."

One or more Consolidated Instruments is standard equipment on most American commercial airplanes — an eloquent tribute to the dependability of our products.

CONSOLIDATED INSTRUMENT COMPANY OF AMERICA, INC.

41 East 42nd Street, New York

Western Representative—M. E. HULSE, 5391 Broadway, Oakland, Calif.

Altimeters, Tachometers, Oil Pressure Gauges, Gasoline Gauges, Thermometers, Air Speed Indicators, Compasses, Navigation Lights, Landing Lights, Dash Lights, etc.

heading or an instrument approach. Banking adds heading problems, and requires both additional nose up (stick back) and additional power.

From the attitude indicator the pilot should scan both the altimeter and the airspeed indicator for the current performance of the aircraft. The digital heading indicator and the digital climb indicator (similar to a VVI), located directly below the altitude indicator, are then scanned. Deviations noted on the altitude indicator are sized by the magnitude of the climb indication. Small vertical velocity deviations can be eliminated by small corrections in pitch accomplished by returning the scan to the attitude indicator and making a small pitch change through elevator input. (Stick forward or backward).

Heading deviations noted during the crosscheck of the heading indicator are usually the result of bank added inadvertently by the pilot or by turbulence. Note the heading deviation, return to the attitude indicator, establish a bank angle, and monitor the heading indicator until a lead point (usually 2-4 degrees) from the desired heading is reached. Roll out on the desired heading, monitoring the attitude indicator.

Once the pilot can keep the aircraft under control, i.e. flying straight and level, he can begin to scan the navigation instruments located on the right bottom of the instrument panel. Once the indications (radials off of VOR 1 and VOR 2) have been read, return the crosscheck to the attitude indicator as you analyze the VOR information.

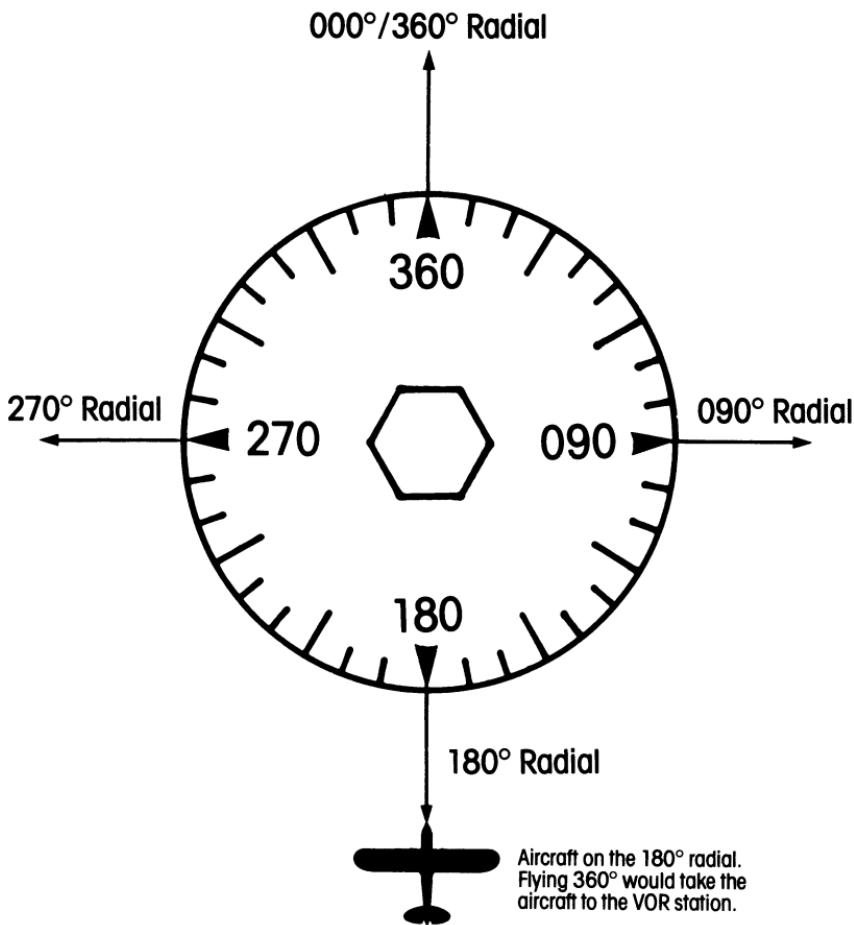
3. VOR NAVIGATION

VOR navigation is based on a series of ground stations that send out radio signals. These signals are received by instruments in the cockpit and decoded and read as bearing to a particular VOR station. There is no range information associated with VOR navigation. Precise positioning is based on either radial triangulation or on radial course guidance, with timing from a known VOR station. The entire United States, and most foreign countries have very complete VOR systems where any point can be defined as an intersection point between multiple VOR stations. In SOLO FLIGHT, each airport is defined as a radial intersection. (A radial bearing is a number from 0 to 360 that if the aircraft was turned and flown on a heading 180 degrees from the radial bearing, the flight path would be inbound to the VOR station.)

North of the VOR station is radial 360, East is 090, South is 180, and West is 270. To find a particular airport in SOLO FLIGHT, the pilot should determine its radial intersection from both VORs. He should then intercept a radial outbound from one of the VORs and fly until the cross radial from the other radial is reached. For example, in the Kansas map, the Kansas City airport is located on the 036 degree radial of VOR 2 with the end of the main runway on the 067 radial of VOR 1. To find the airport in the weather, the instrument pilot could establish himself on the 036 degree radial of VOR 2, heading 036, and descend to missed approach altitude (200-500 feet above field elevation) until crossing the missed approach radial, the 067 of VOR 1.

In the more difficult maps, VOR navigation must be used to ensure that the SOLO FLIGHT aircraft does not run into the mountain ranges in the particular state. After each approach has been flown, the program will plot your course on the video map. The SOLO FLIGHT pilot can then review his actual flight path with the one he was trying to fly.

VOR NAVIGATION

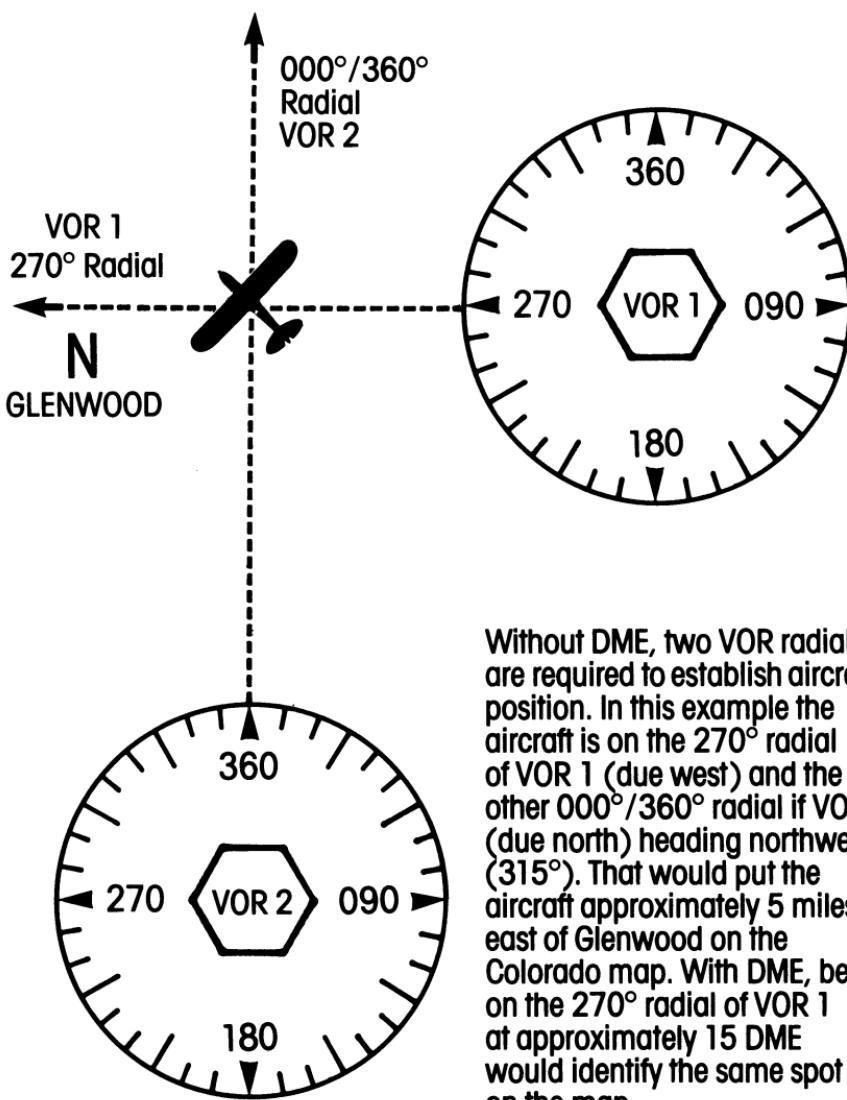


VOR stations send out continuous radio signals that are read by the instruments in the cockpit.

The reading in the cockpit is the radial

of the VOR on which you are currently located. If you turned the aircraft to a heading exactly 180° from the radial bearing, you would fly directly to the VOR station.

VOR POSITIONING



Without DME, two VOR radials are required to establish aircraft position. In this example the aircraft is on the 270° radial of VOR 1 (due west) and the other 000°/360° radial if VOR 2 (due north) heading northwest (315°). That would put the aircraft approximately 5 miles east of Glenwood on the Colorado map. With DME, being on the 270° radial of VOR 1 at approximately 15 DME would identify the same spot on the map.

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	22	23	24
C-64	R	S	R
APPLE	V	U	X
IBM	X	B	U

4. INSTRUMENT APPROACHES

Instrument approaches can be high altitude, low altitude, precision, or non-precision.

A. HIGH ALTITUDE APPROACHES

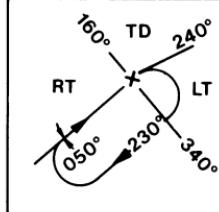
High Altitude Approaches consist of a high altitude holding fix, an Initial Approach Fix (IAF), and a prescribed route for the aircraft to fly to avoid either physical obstructions (i.e., in mountains around Denver) or to avoid heavily traveled approach routes (New York City's Kennedy or Chicago's

HIGH ALTITUDE APPROACH

HI-VOR RWY 36L

BUCKLEY ANGB
AURORA, COLORADO

DENVER APP CON
119.3 307.3
BUCKLEY TOWER
121.0 289.6
GND CON
121.6 275.8
ASR/PAR



[DENVER 117.0 DEN -.-.]

180°
150°
120°
105°
120°
150°
050°
230°
[IAF] GAYLE DEN/180

[ROCK SPRINGS 122.0 RSP -.-.]

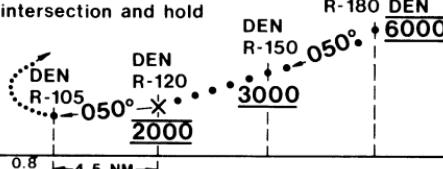
CAUTION: High Mountainous Terrain West of Airport

EMERGENCY SAFE ALT 100 NM 16,500

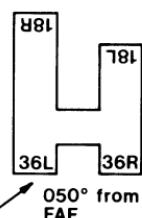
MIN SAFE ALT 25 NM 10,500

MISSED APPROACH

Climbing right turn to 3000, direct to DEN 150/RSP 050 intersection and hold



ELEV 500



CATEGORY

B

C

D

S-36L

700/40
[200-3/4]

800/50
[300-1]

1000/40
[500-11/4]

CIRCLING

800-1
[300-1]

1000-1 1/2
[500-11/2]

1100-2
[600-2]

S-PAR/ILS

600-1/2
[100-1/2]

600-1/2
[100-1/2]

600-1/2
[100-1/2]

FAF to MAP 4.5 NM

Knots 80 90 100

Min-Tenths 3.4 3.0 2.7

HI-VOR RWY 36L

39°43'N - 104°45'W

AURORA, COLORADO
BUCKLEY ANGB

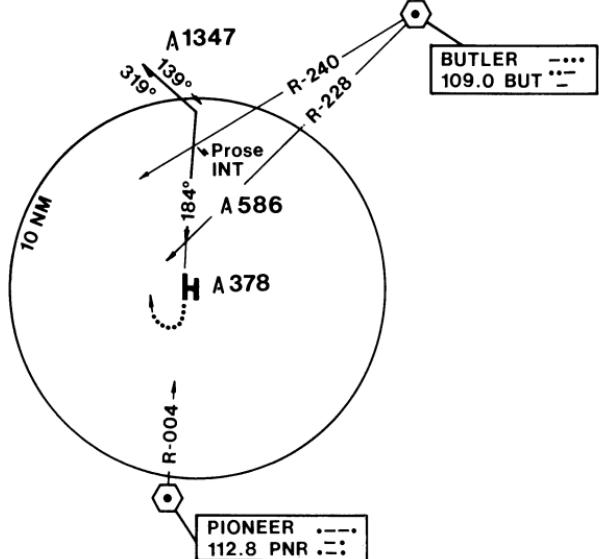
O'Hare). The aircraft will penetrate (when cleared by approach control) by reducing power, descending at constant airspeed, and turning to intercept a radial inbound to a Final Approach Fix (FAF). The pattern often resembles a large teardrop that uses the VOR as the pointed end of the teardrop. The final approach fix is a geographic position aligned with the approach runway usually 5 to 10 miles from the airport. The aircraft should be configured for landing and headed inbound on a heading approximately that of the landing runway. The route from the FAF to the runway is usually a straight in. The pilot should descend to arrive at the Minimum Descent

LOW ALTITUDE APPROACH

VOR RWY 18R

WICHITA, KANSAS

APP CON
120.6 269.1
TOWER
126.2 295.7
GND CON
121.6 275.8
ATIS
119.5



EMERGENCY SAFE ALT 100 NM 4100

Remain within
10 NM

Prose INT

MISSED APPROACH
Climbing right turn to 2000
direct to Prose INT and hold

2000

184°

004°

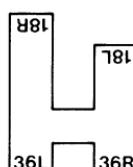
1500

BUT
R-228

5.9 NM 0.8 NM

ELEV 50

184° from
Prose INT



CATEGORY	B	C	D
S-18R	150-2 [100-2]	250-2 [200-2]	250-2 [200-2]
CIRCLING	250-2 [200-2]	350-2 [300-2]	350-2 [300-2]
FAF to MAP 5.9 NM			
Knots	80	90	100
Min-Tenths	4.4	3.9	3.5

VOR RWY 18R

47°03'N-109°28'W

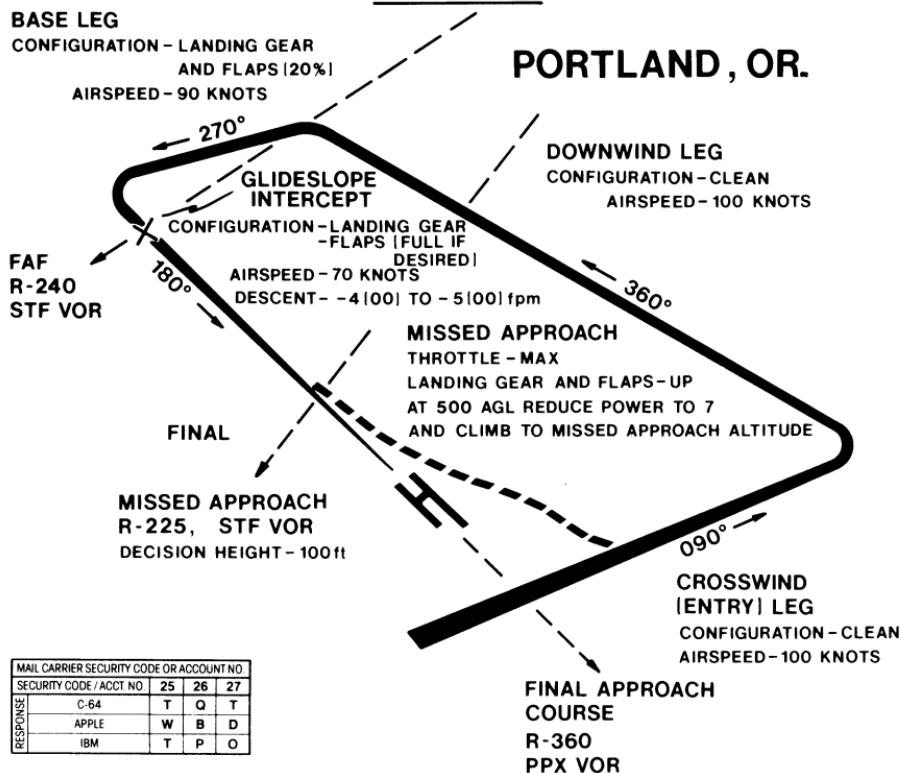
WICHITA, KANSAS

Altitude (MDA, 200-500 feet above field elevation) 30-45 seconds prior to MAP (Missed Approach Point). In SOLO FLIGHT the MAP is defined by a crossing radial from the VOR not providing final approach guidance. (The MAP can also be defined by using timing from the VOR to the approach end of the runway at constant airspeed.) If the runway is in sight at or prior to the MAP, and the aircraft is conveniently aligned with the runway, the pilot can land. If these conditions are not met, the pilot should advance power, go around, and try the approach again, or go to a different airport. (Your SOLO FLIGHT aircraft is a simulated 1930 vintage monoplane with a service ceiling of approximately 9000 feet. The SOLO FLIGHT aircraft can fly practice high altitude approaches from as high as 9000 feet.)

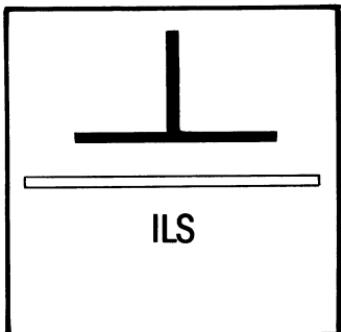
B. LOW ALTITUDE APPROACHES

Low Altitude Approaches are quite similar to high altitude approaches. They are defined with an initial holding fix, a prescribed route from the holding fix to the final approach fix that includes a descent and a turn to approximately the inbound heading to the runway, a Final Approach Fix, and a missed approach point. The difference between a high altitude approach and a low altitude approach is that a low altitude approach is usually accomplished much closer to the airport and at lower airspeeds. The objective of both of these non-precision approaches is to get the aircraft aligned with the runway to make a safe landing if the aircraft can break out of the weather prior to reaching the MAP.

BOX ILS PATTERN



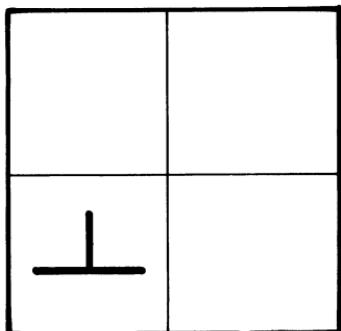
ILS (Instrument Landing System)



APPLE, ATARI and IBM

Aircraft above GLIDESLOPE — lower nose, adjust power, and fly back down to GLIDESLOPE.

(Use directional guidance from radial and aircraft heading indicators.)



C-64

Aircraft below and left of GLIDESLOPE — raise nose, adjust power, and turn right to fly aircraft back up to GLIDESLOPE.

C. LOW ALTITUDE RADAR/BOX PATTERNS

Both the high and low altitude approaches previously described are penetrations that are used when the aircraft arrives at the destination airport at an altitude above normal final approach altitude. The pilot may also be asked to fly a standard "BOX" pattern for positioning to a VOR final, an ILS final, or a Ground Controlled Approach (GCA). A box pattern is a rectangular approach with one long side of the rectangle defined by the landing runway. A 90 degree turn either left or right after takeoff is "crosswind". Crosswind is used to provide spacing between multiple aircraft. Turning 90 degrees again (to be 180 degrees from runway heading) puts the aircraft on downwind. A 90 degree turn back toward final approach puts the aircraft on base leg. (The aircraft should be configured with gear and flaps by base leg and flown at 10-15 knots above final approach airspeed.) Turning from base leg to final approach can be accomplished by one 90 degree turn to runway heading or by two 45 degree turns. Using two 45 degree turns is called DOGLEG to final. The objective of the box pattern is to position the aircraft on final approach, headed inbound, with enough time to descend to the MDA prior to the MAP! Use the SOLO FLIGHT PRACTICE/IFR option to practice box patterns using one VOR for final approach guidance and the second VOR to define a cross radial as the MAP. Your video map will plot your actual course once you have landed at your destination.

5. DESIGN YOUR OWN INSTRUMENT APPROACH!!

New pilots learn to solo, learn to go cross-country, and then take on the challenge of becoming an instrument pilot. Three instrument approaches are illustrated in your SOLO FLIGHT manual. A high altitude approach to Denver, CO, a low altitude approach to Wichita, KS, and an ILS box pattern to Portland OR. However, SOLO FLIGHT gives you the opportunity to build any number of different approaches to any of the 21 airports in the Mail Pilot game!! Once you have constructed your own approach, you can fly it and see the results both from your success in making a landing at the destination airport and in the route displayed on your video map after landing.

To design your own approach, you will need the following elements:

1. Final approach guidance from/to a VOR on a specified radial.
2. Missed Approach Point (MAP) or Decision Height (ILS) defined by a cross radial or timing from a VOR station. (Altitude for DH.)
3. Final Approach Fix (FAF) defined as a cross radial or a VOR station.
4. Initial Approach Fix (IAF) (usually higher and not colocated with the FAF).
5. Route/Descent from the IAF to the FAF.
6. Altitude restrictions on the approach.
7. Holding pattern and holding instructions, if desired.

(If you use plastic to cover your SOLO FLIGHT maps and approach plates, you can use a favorite pilot tool, the grease pencil, to design your own approaches.)

The approach design must take into account the proximity of the VOR's, terrain clearance needed, and the runway heading. Your local library should be able to provide you with further information on instrument flying skills. Use the examples in the SOLO FLIGHT manual to design your own approach on the blank approach plate provided in the manual. Good flying and safe landings to you!!!

C. PRECISION APPROACHES

The high and low altitude and box pattern VOR approaches are defined as non-precision approaches because no direct glideslope information (altitude versus distance to runway) is available to the pilot. Precision approaches can be flown in SOLO FLIGHT by combining VOR final approach and MAP positioning with Instrument Landing System (ILS) glideslope information. The ILS indicator is located on the right side of the instrument panel, just above the VOR indicators. The horizontal line on the instrument panel represents the correct final approach altitude. The aircraft symbol position indicates the aircraft altitude relative to the proper glideslope. (The glideslope is normally a 3-5 degree descent from the final approach fix to Decision Height. DH is the same as MDA but defined as minimum altitude allowed on the glideslope.) If the aircraft symbol is above the horizontal line, the aircraft is above glideslope. Reduce power slightly and lower the nose to increase the descent rate by 2(00) to 3(00) feet per minute. As the aircraft symbol centers on glideslope, increase power slightly and raise the nose to reestablish the correct -4(00) to -5(00) FPM descent rate. If the aircraft symbol is below the horizontal line, the aircraft is below glideslope. The pilot must reduce his descent rate or climb slightly to reestablish the proper glideslope. Once the aircraft is maintaining the proper glideslope

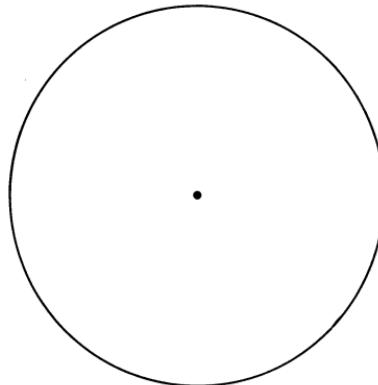
DESIGN-YOUR-OWN-APPROACH

VOR/ILS RWY _____

APP CON

TOWER

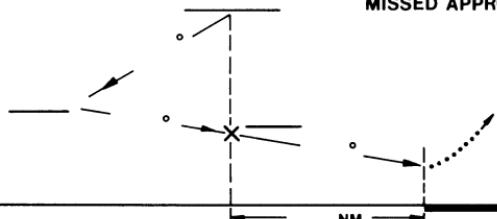
GND CON



EMERGENCY SAFE ALT 100 NM

1. Decide Destination and draw runway in center
2. Draw in VORs
3. Determine inbound final approach course
4. Determine cross radial altitude restrictions, FAF, and MAP
5. Fly approach

MISSED APPROACH



CATEGORY	B	C	D	FAF to MAP		NM
	S-			Knots	80	90
CIRCLING					Min-Tenths	

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT NO.	28	29	30
RESPONSE	O	P	L
C-64	O	P	L
APPLE	J	D	M
IBM	E	P	Z

VOR/ILS RWY _____

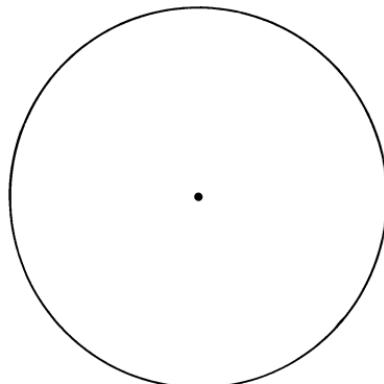
DESIGN-YOUR-OWN-APPROACH

VOR/ILS RWY _____

APP CON

TOWER

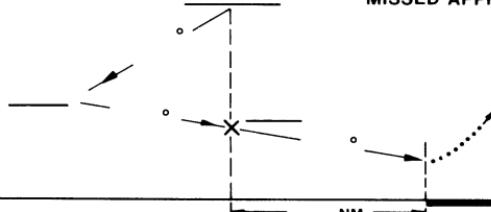
GND CON



EMERGENCY SAFE ALT 100 NM

1. Decide Destination and draw runway in center
2. Draw in VORs
3. Determine inbound final approach course
4. Determine cross radial altitude restrictions, FAF, and MAP
5. Fly approach

MISSED APPROACH



CATEGORY	B	C	D	FAF to MAP		NM
	Knots	80	90	100		
S-						
CIRCLING				Min·Tenths		

VOR/ILS RWY _____

and radial heading, fly down the glideslope until DH or the runway is sighted, whichever occurs first. (If MDA position or DH altitude is reached without the runway in sight with the aircraft in position for a safe landing, advance power and execute a missed approach. Try another approach or go to another airport!!)

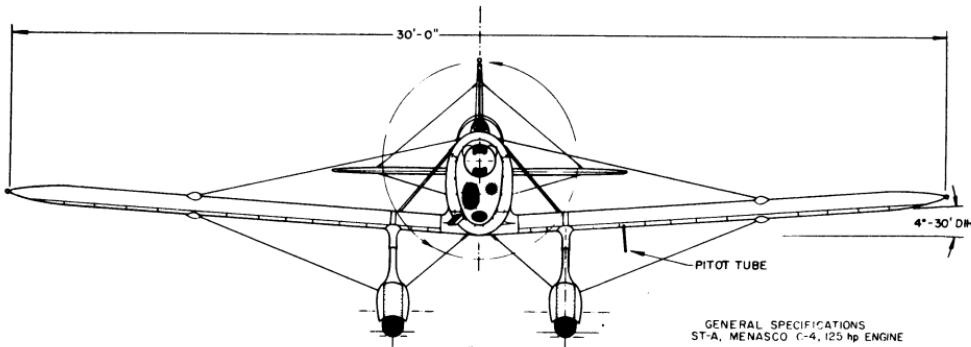
D. ILS

ILS is the most accurate automated landing system currently available to pilots in bad weather. Some modern airliners can land in near 0/0 conditions. (0 visibility and 0 ceiling). Your SOLO FLIGHT weather minimums are 250 feet ceiling and $\frac{1}{4}$ mile visibility. Practice your ILS approaches first in VFR conditions using the FLYING/CLEAR option. Practice IFR using the FLYING/IFR option. With sufficient practice, you will feel confident in your ability to survive when real instrument conditions occur!!

Remember, a good instrument pilot makes only one approach to his landing runway. The adrenalin factor goes up considerably if the pilot has made a number of non-successful approaches, his fuel is getting low, and the nearest alternate is 250 miles away with worse weather!!! The best thing the pilot can do is to do the first approach right — on airspeed, on altitude, and ready to land if he sees the landing runway somewhere around the MAP!!

On ATARI, IBM, and Apple versions, your ILS indicator gives glideslope information only. When the small aircraft symbol is above the fixed line in the center of the ILS display, your aircraft is above glideslope. You should lower the nose slightly to increase your descent rate to return to the glideslope. Just the opposite is true when you are below glideslope (symbol below the line.) Combine this information with the VOR radial guidance (fly up/down the required radial) to make a full ILS approach.

On C-64 versions, your ILS also has localizer, left/right indicators. Use the indication exactly as described above. Fly the aircraft symbol back to the center of the ILS indicator for proper ILS descent. An ILS landing should direct you to a perfect landing 500-1500 feet down the runway.



POWER - MENASCO C-4 FOUR CYLINDER
INVERTED INLINE AIRCOOLED
ENGINE RATED 125 H.P. AT 2,175 RPM

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.		
SECURITY CODE / ACCT. NO.	31	32
C-64	W	V
APPLE	B	G
IBM	M	F

GENERAL SPECIFICATIONS ST-A, MENASCO C-4, 125 hp ENGINE

WEIGHT EMPTY	1,035 lbs.
USEFUL LOAD	565 lbs.
GROSS WEIGHT (MAX.)	1,600 lbs.
MAXIMUM SPEED AT S.L.	150 mph
CRUISE SPEED AT 2,000 FT	120 mph
RANGE AT CRUISE	380 miles
CLIMB AT S.L. (MAX. EFFORT)	1,200 ft./min.
SERVICE CEILING	17,500 feet
LANDING SPEED, WITHFLAPS	60 mph
LANDING SPEED, FLAPS UP	70 mph
TAXIING RUN, FULL LOAD	175 yards
WING AREA	120 sq. ft.
POWER LOADING	12.8 lbs./hp
WING LOADING	12.9 lbs./sq. ft.

CREDITS

SOFTWARE AND PROJECT IMPLEMENTATION

Sid Meier

PRODUCT CONCEPT

Sid Meier

PRODUCT CONVERSIONS

C-64 - Grant Irani

APPLE - Andy Hollis

IBM - Randall Masteller

COVER ART

Dave Martin

DOCUMENTATION

George Geary, Bill Stealey, Sid Meier

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SIMULATION SOFTWARE from MICROPROSE

HELLCAT ACE is available for Commodore 64, ATARI, Apple (534.95), and IBM PC/PC Jr. (534.95)



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3-Dimensional
Aerial Combat
Over the Pacific
in World War III!



F-15 STRIKE EAGLE is available for Commodore 64, ATARI, and Apple

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Accelerated
Real-Time
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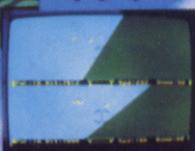


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3-Dimensional
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Over Europe in
World War III!!



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